

Montana Content Standards Integration Chart for Science

Science	Standards	Grade 4	Grade 8	Upon Graduation
	Standard 1-Students design, conduct, evaluate and communicate scientific investigations.	1. Be given a testable question, plan, design, and safely conduct a scientific investigation with identified variables. [TE - 5.4.2]. LM - 1.4.1; 1.4.2; 1.4.3. MA - 6.4.3. WR - 6.4.1. 2. Select and accurately use appropriate tools to measure (in SI units), process and analyze results of a basic scientific investigation. TE - 2.4.1; 2.4.3. MA - 5.4.2; 5.4.3; 6.4.1. WR - 6.4.2. WP - 3.4.2. 3. Represent, communicate and provide supporting evidence of scientific investigations. TE - 2.4.2. [HE - 1.4.3; 1.4.5]. [RE - 1.4.1; 1.4.2; 1.4.4]. [SL - 2.4.3; 3.4.1]. WR - [1.4.1; 1.4.2; 1.4.3; 1.4.4; 2.4.1; 2.4.2; 2.4.3; 2.4.4]; 6.4.3. 4. Describe relationships among parts of a familiar system (e.g., digestive system, simple machines) and identify and record changes and patterns of changes in the system. [TE - 6.4.3]. MA - 7.4.1. WR - 6.4.4. 5. Construct models that illustrate simple concepts and compare those models to what they represent. TE - 6.4.1. [HE - 1.4.2]. WR - 6.4.4. WP - 3.4.3. 6. Communicate results from a controlled experiment and are reproducible. [TE - 6.4.1; 3.4.2]. HE - 1.4.3. LM - 1.4.6. [SL - 3.4.1]. WR - [1.4.1; 1.4.2; 1.4.3; 1.4.4; 2.4.1; 2.4.2; 2.4.3; 2.4.4]; 2.4.5; [6.4.3]; 6.4.4.	1. Identify a question, formulate a hypothesis, control and manipulate variables, devise and safely conduct experiments, predict outcomes and compare and analyze results. TE - 5.8.1. LM - 1.8.1; 1.8.2; 1.8.3. MA - 6.8.1; 6.8.3; 6.8.5. WR - 6.8.1. 2. Select and accurately use appropriate equipment and technology to measure (in SI units), gather, process and analyze data from a scientific investigation. TE - 2.8.2; 2.8.3. MA - 5.8.2; 5.8.4. [WP - 3.8.2]. WR - 6.8.2. 3. Communicate and defend results of investigations; question results of investigations if different from predicted. [TE - 3.8.1]. [SL - 2.8.3; 3.8.1; 3.8.2; 3.8.3]. WR - [1.8.1; 1.8.2; 1.8.3; 1.8.4; 2.8.1; 2.8.2; 2.8.3; 2.8.4]; 2.8.5; 6.8.3. 4. Analyze the processes, parts and sub-system of familiar (e.g., electrical circuits, bacteria) and infer cause and effect relationships among components of the system. [TE - 5.8.1]. [RE - 1.8.1; 1.8.2; 1.8.4]. [WP - 4.8.1]. WR - 6.8.4. 5. Create models to illustrate scientific concepts and use the model to predict change (e.g., computer simulation, a stream table, graphic representation). TE - 3.8.1; [6.8.1]. [SL - 3.8.1]. WR - [5.8.1; 6.8.3]; 6.8.4. 6. Distinguish between controlled and uncontrolled experiments by consistency of results. WR - 6.8.4.	1. Identify a testable question, formulate a hypothesis based on prior scientific knowledge, identify dependent and independent variables, safely conduct the experiment, collect and analyze data. TE - 5.12.1. LM - 1.12.1; 1.12.3. WR - 6.12.1 2. Select appropriate means for representing, communicating, and defending results of investigations and scientific and technological arguments using appropriate mathematical analysis and graphical representation. TE - 1.12.1; 2.12.1; 2.12.2. MA - 1.12.5. [SL - 3.12.2; 3.12.3]. WR - [1.12.1; 1.12.2; 1.12.3; 1.12.4; 2.12.1; 2.12.2; 2.12.3; 2.12.4]; 4.12.3; 4.12.5; 6.12.2. 3. Question conclusions with insufficient supporting evidence, and recognize that the results of a scientific investigation are always open to revision by further experiments. [TE - 5.12.2]. LM - 1.12.2. WR - 6.12.3. 4. Analyze and apply the concepts of change and equilibrium in a variety of systems (e.g., geochemical systems, global climate). [RE - 1.12.1; 1.12.2; 1.12.4]. WR - 6.12.4. 5. Compare observations of the real world to observations of a constructed model. [RE - 1.12.1]. WR - 6.12.4. 6. Investigate and evaluate science studies and identify strengths and weaknesses in experimental design. RE - 4.12.2; [4.12.7]. WR - 6.12.4.
	Standard 2-Students demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.	1. Examine, describe, compare and classify tangible objects in terms of common physical properties. [WR - 6.4.4]. 2. Create mixtures and separate them based on different properties (e.g., salt and sand, iron filings and soil, oil and water). 3. Model and explain that matter exists as solids, liquids and gases and can change from one form to another. [TE - 3.4.1]. [WR - 6.4.4]. 4. Identify and predict what changes and what remains unchanged when matter experiences an external influence. [TE - 3.4.1]. [RE - 1.4.1]. [WR - 6.4.4]. 5. Identify, build, and describe mechanical systems (e.g., simple and complex machines). [TE - 6.4.3]. [WR - 4.4.2; 6.4.4]. 6. Describe the basic characteristics of light, heat, magnetism and sound. [TE - 5.4.1]. [WR - 6.4.4].	1. Examine, describe, compare and classify objects and substances based on common physical properties and simple chemical properties. [WR - 6.8.4]. 2. Classify, describe, and model matter in terms of elements, compounds, mixtures, atoms and molecules. [TE - 3.8.1]. [WR - 6.8.4]. 3. Model and explain that states of matter, solids, liquids and gases, are dependent upon the quantity of energy present in the system. [TE - 3.8.1; 5.8.3]. [WR - 6.8.4]. 4. Identify and predict what will change and what will remain unchanged when matter experiences an external force or energy change. [TE - 3.8.1]. [RE - 1.8.1]. [WR - 6.8.4]. 5. Identify, build, describe, measure, and analyze mechanical systems (e.g., simple and complex machines). [TE - 6.8.1]. [WR - 6.8.4]. 6. Define energy and compare and contrast the characteristics of light, heat, motion, magnetism, electricity, sound and mechanical waves. [TE - 5.8.1]. [WR - 6.8.4].	1. Classify and predict chemical and physical properties of matter (electrical charge, current, pH). [WR - 6.12.4]. 2. Describe and explain physical interactions of matter using conceptual models (e.g., conservation laws of matter, particle model for gaseous behavior). [TE - 3.12.1]. [WR - 6.12.4]. 3. Identify, measure, calculate, and analyze quantitative and qualitative relationships associated with matter and energy transfer or transformation. [TE - 5.12.3]. [WR - 6.12.4]. 4. Describe and predict chemical reactions and physical interaction of matter using words and symbolic equations. [TE - 5.12.1]. [WR - 6.12.4]. 5. Identify the four fundamental forces (gravity, magnetic, weak nuclear force and strong nuclear force) of nature and describe the impact of each on matter. [TE - 5.12.1]. WR - 2.12.5; 6.12.4. 6. Identify, describe, and explain physical and chemical changes involving the conservation of matter and energy and entropy in a closed system. [TE - 5.12.3]. [WR - 6.12.4].
	Standard 3-Students demonstrate knowledge of characteristics, structures and function of living things, the process and diversity of life, and how living organisms interact with each other and their environment.	1. Identify that plants and animals have structures and systems, which serve different functions. [TE - 5.4.1]. 2. Identify and describe basic requirements of energy needed and nutritional needs for each human body system. [TE - 4.5.1]. HE - 1.4.1; 1.4.2; 1.4.4. [WR - 6.4.4]. 3. Develop models that trace the life cycles of different plants and animals and discuss how they differ from species to species. [TE - 2.4.1; 2.4.2]. [WR - 6.4.4]. 4. Explain cause and effect relationships in living systems and nonliving components within ecosystems. [TE - 3.4.1]. [RE - 5.4.1; 5.4.2]. [WR - 6.4.4]. 5. Create and use a classification system to group a variety of plants and animals according to their similarities and differences. [TE - 6.4.4]. [RE - 1.4.4; 5.4.1; 5.4.2]. WR - 5.4.2.	1. Compare the structure and function of prokaryotic cells (bacteria) and eukaryotic cells (plant, animal, etc). [TE - 5.8.1]. [WR - 6.8.4]. 2. Explain how organisms and systems of organisms obtain and use energy resources to maintain stable conditions and how they respond to stimuli (e.g., photosynthesis, respiration). [TE - 3.8.1]. [WR - 6.8.4]. 3. Communicate the differences in the reproductive processes of a variety of plants and animals using the principle of genetic modeling (e.g., Punet squares). [TE - 5.8.3]. [WR - 6.8.4]. 4. Investigate and explain the interdependent nature of biological systems in the environment and how they are affected by human interaction. [TE - 5.8.1]. [WR - 6.8.4]. 5. Use a basic classification scheme to identify local plants and animals. [RE - 1.8.4; 5.8.1; 5.8.2].	1. Investigate and use appropriate technology to demonstrate that all cells have common features as well as differences that determine function and that they are composed of common building blocks (e.g., proteins, carbohydrates, nucleic acids, lipids). TE - 2.12.1; 2.12.2; 2.12.3; 3.12.1; [3.12.2]. 2. Describe and explain the complex processes involved in energy use in cell maintenance, growth, repair and development. [TE - 3.12.1]. [WR - 6.12.4]. 3. Model the structure of DNA, protein synthesis, and the molecular basis of heredity and how it contributes to the diversity of life. [TE - 3.12.1]. 4. Predict and model the interaction of biotic and abiotic factors, which limit populations (natural selection), and contribute to the change of a species over time (evolution). [TE - 5.12.1]. [RE - 5.12.2]. 5. Apply a biological classification scheme to infer and discuss the degree of species divergence using local ecosystems. [TE - 6.12.4]. [RE - 1.12.4; 5.12.1; 5.12.2].
	Standard 4-Students demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.	1. Describe and give examples of Earth's changing features. [TE - 5.4.3]. [WR - 6.4.4]. 2. Describe the physical properties of Earth's basic materials (including soil, rocks, water and gases). [TE - 3.4.1]. [WR - 6.4.4]. 3. Investigate fossils and make inferences about life and the environment long ago. [TE - 5.4.1]. [WR - 6.4.4]. 4. Observe and describe local weather and demonstrate how weather conditions are measured. [TE - 6.4.3]. [WR - 6.4.4]. 5. Identify seasons and explain the difference between weather and climate. [TE - 5.4.3]. [WR - 6.4.4]. 6. Describe objects in the sky and explain that light and heat comes from a star called the Sun. [TE - 5.4.3]. [WR - 6.4.4].	1. Model and explain the internal structure of the Earth and describe the formation and composition of Earth's external features in terms of the rock cycle and plate tectonics. [TE - 3.8.1; 5.8.3]. [ML - 2.8.1; 3.8.1]. [WR - 6.8.3]. 2. Differentiate between rocks and classify rocks by how they are formed. [TE - 5.8.3]. [WR - 6.8.3]. 3. Explain scientific theories about the origin and evolution of the Earth and Solar System by describing how fossils are used as evidence of climatic change over time. [WR - 6.8.3]. 4. Describe the water cycle, the composition and structure of the atmosphere, and the impact of oceans on large scale weather patterns. [TE - 3.8.1]. [WR - 6.8.3]. 5. Describe and model the motion and tilt of Earth in relation to the Sun, and explain the concept of day, night, seasons, year. [TE - 5.8.3]. [WR - 6.8.3]. 6. Describe the Earth, Moon, planets and other objects in space in terms of size, structure, and movement in relation to the Sun. [TE - 5.8.3]. [WR - 6.8.3].	1. Use the theory of plate tectonics to explain the inner relationship between earthquakes, volcanoes, and sea floor spreading. [TE - 6.12.1]. [WR - 6.12.4]. 2. Identify and classify rocks and minerals based on physical and chemical properties. [TE - 5.12.3]. [WR - 6.12.4]. 3. Relate how evidence from advanced technology, applied to scientific investigations (e.g., large telescopes and space-borne observatories), has dramatically impacted our understanding of the origin, size, and evolution of the Universe. TE - 2.12.2; 2.12.3; 3.12.1. [WR - 6.12.4]. 4. Collect and analyze local, regional, and global weather-related data in order to make inferences and predictions about weather patterns. [TE - 6.12.1]. RE - 1.12.1; 4.12.3. [WR - 6.12.4]. 5. Explain the impact of terrestrial, Solar, oceanic, and atmosphere conditions on global climatic patterns. [TE - 5.12.3]. [WR - 6.12.4]. 6. Describe the origin, location, and evolution of stars and their planetary systems in respect to the Solar System, the Milky Way, the Local Galactic Group, and the Universe. [TE - 5.12.3]. [WR - 6.12.4].
	Standard 5-Students understand how scientific knowledge and technological developments impact society.	1. Give examples of how people use science and technology. TE - 4.4.3. [HE - 1.4.5]. ML - 2.4.1. [RE - 4.4.5]. [WP - 6.4.5]. 2. Model scientific collaboration by sharing and communicating ideas and solutions in a variety of cooperative settings. TE - 3.4.2. [AR - 1.4.4]. WP - 5.4.2. [WR - 6.4.3]. 3. Use current scientific knowledge to make inferences and propose solutions for local environmental problems (recycling, waste management). [TE - 6.4.4]. HE - 1.4.5. [RE - 4.4.6]. [WR - 6.4.3]. 4. Identify a scientific or technological innovation that benefits the community. TE - 4.4.3; [6.4.3]. [RE - 4.4.6].	1. Identify the specific fields of scientific endeavor and related occupations within those fields. [RE - 4.8.5]. [WP - 6.8.1]. 2. Model collaborative problem solving and give examples of how scientific knowledge is shared, critiqued, and scrutinized by other scientists and the public. TE - 3.8.2. ML - 4.8.3. 3. Investigate local problems and/or issues and propose solutions or products that address a need, which considers variables (e.g., environmental risks). [TE - 6.8.3; 6.8.4]. [RE - 4.8.6]. 4. Apply scientific knowledge and process skills to understand issues and everyday events. [RE - 4.8.5; 4.8.6].	1. Identify and describe key factors (technology, competitiveness, world events, etc.) that affect the development and acceptance of scientific thought. [TE - 4.12.3]. RE - 4.12.5. [WR - 6.12.4]. 2. Model the ongoing, collaborative scientific process of gathering and evaluating information (e.g., assess evidence for and against theories, look for patterns, devise and retest different models). [TE - 3.12.1]. RE - 4.12.7. 3. Analyze benefits, limitations, costs, consequences, and ethics involved in using scientific and technological innovations to make reasoned decisions. TE - 4.12.2; 4.12.3. ML - 2.12.1; 4.12.3. [RE - 4.12.6]. [WR - 6.12.4]. 4. Give examples of scientific innovation challenging commonly held perceptions. TE - 4.12.3; 6.12.4. [RE - 4.12.5; 4.12.6; 4.12.7]. [WR - 6.12.4].
	Standard 6-Students understand historical developments in science and technology.	1. Give historical examples of scientific and technological contributions to society. [TE - 4.4.3]. [RE - 4.4.2; 4.4.3]. SS - 4.4.5. 2. Describe how scientific inquiry has produced much knowledge about the world. [HE - 1.4.5]. [RE - 4.4.4]. SS - 4.4.5.	1. Trace developments that demonstrate scientific knowledge is subject to change as new evidence becomes available. [TE - 5.8.3]. [RE - 4.8.2; 4.8.3]. SS - 4.8.5. 2. Identify major milestones in science that have impacted science, technology and society. TE - 4.8.3. [HE - 1.8.1; 1.8.5]. [RE - 4.8.4]. SS - 4.8.5.	1. Give examples of scientific discoveries and describe the interrelationship between technological advances and scientific understanding. TE - 4.12.3. [RE - 4.12.2; 4.12.3]. SS - 4.12.6. [WP - 4.12.1]. 2. Analyze and illustrate the historical impact of scientific and technological advances. TE - 4.12.3; 6.12.1. [RE - 4.12.4]. SS - 4.12.6. [WP - 4.12.1].
<div><div>LEGEND:</div><div><div>This chart illustrates the “explicit” and “implicit” overlaps in the standards. With “explicit” overlaps, a teacher will naturally cover both standards. With “implicit” (in brackets ex: [RE - 1.4.2]) a teacher could easily teach both standards with minor adjustments.</div><div><div>Content Code:</div><div>AR - Arts (dark pink) ML - Media Literacy (blue) TE - Technology (purple) User Code:</div><div>HE - Health Enhancement (black) RE - Reading (blue) WP - Workplace Competencies (yellow) SC 1.4.2 = Science, Standard 1, Grade 4, Benchmark 2</div><div><div>LM - Library Media (pink) SC - Science (red) WL - World Languages (ilac)</div><div>LT - Literature (blue) SS - Social Studies (gold) WR - Writing (blue)</div><div>MA - Math (green) SL - Speaking and Listening (blue)</div></div></div></div></div>				